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Mortality in Davidson County: Methods and Trends, 1990-2000

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Recently, there have been several changes in the way death rates are calculated. A previous article in the September/October 2000 edition of *Public Health Watch* covered two changes – 1) the Tenth Revision of the International Classification of Diseases (ICD-10) and 2) a new standard population for age-adjusting death rates. Since that time, one more change has occurred – the Census 2000 count was released, and we learned that Davidson County grew much faster than expected.

This article will review the methodological changes to mortality statistics (death rates), and discuss their implications. Then we will apply the changes to Davidson County's mortality data from 1990 to 2000, compare our rates to Tennessee and U.S. rates, and examine trends.

The statistics affected by these methodological changes are the crude death rate and the age-adjusted death rate. The crude death rate is the number of deaths that occurred in Davidson County in a period of one calendar year divided by the mid-year population of Davidson County residents. The age-adjusted death rate is a summary rate that is calculated through a process of standardization, whereby crude rates for specific age groups are multiplied by an adjustment factor and then added. Standardization removes differences in the age composition or distribution between two populations or in one population over time. By removing the age-distribution differences, we can compare death rates from Davidson County to other cities or the U.S., and we can study death rate trends within Davidson County over a period of many years.

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Adult Immunization: Preparing for Flu Season

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Influenza (flu) and pneumonia together are the 7th leading cause of death in the United States, and the 5th leading cause of death among adults aged 65 and older.[1] On average, influenza alone is responsible for 20,000 deaths and 110,000 hospitalizations every year. During severe flu seasons, influenza may account for as many as 40,000 deaths and 300,000 hospitalizations nationally.[2]

In Nashville, there were 120 deaths attributable to influenza and pneumonia in 2000, making them together, the 7th leading cause of death in Nashville and the only vaccine-preventable cause of death among the top ten leading causes.[3]

The influenza vaccine has been shown to be safe and effective in preventing illness in up to 90% of healthy adults.[4] If a healthy adult is vaccinated and still ends up getting the flu, the vaccine may cause the symptoms to be less severe or it may cause the course of the illness to be shorter. The effectiveness of the vaccine is decreased among individuals who are

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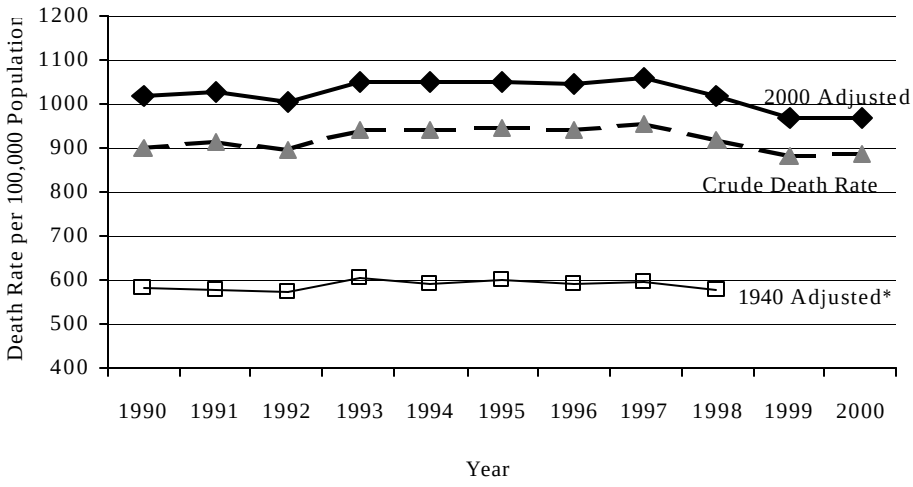
In This Issue:

❖ New Standard Population

Beginning with the 1999 death rates, the U.S. Department of Health and Human Services instituted that all of its agencies must use the year 2000 projected population as the new standard population.[1] Previously, various groups that published mortality statistics used the 1940, 1970, or 1980 U.S. populations to standardize rates. As a result, the purpose of age-standardization was defeated and many age-adjusted mortality statistics could not be compared because different standard populations were used. For more information on the rationale behind the change in standard population, please see the Sept/Oct 2000 edition of *Public Health Watch*. (http://healthweb.nashville.org/Web%20Docs/pdf%20copies/septoct2000.pdf)

Figure 1. Crude and Age-Adjusted Death Rates for Davidson County, TN, 1990-2000



*Age-adjusted rates using the 1940 standard population were not calculated past 1998 because the new standard population (year 2000 population) was instituted in 1999.

To estimate the effects this new standard population would have on Davidson County mortality statistics, we recalculated all mortality statistics for 1990-1998, using the new standard population. Adjusting death rates to the year 2000 standard population resulted in rates that were much closer to the crude death rates (CDR) in Davidson County (see Figure 1). The same result was seen when the 1995 U.S. rates were re-adjusted.[4] The closer alignment between the crude and age-adjusted rates is due to the fact that the age distribution of the population of Davidson County is more similar to the year 2000 standard population than the 1940 standard population (see Figure 2).

Age standardization with the year 2000 population also reduced the difference between Davidson County's death rates and the U.S. rates. Davidson County death rates with the 1940 adjustment were an average 20% higher than the U.S. rates over the years of 1990 to 1998. With the new adjustment, Davidson County rates are an average of 15% higher than the U.S. rates. Overall, mortality in Davidson County is still higher than that in the U.S., but the disparity is less than previously estimated. This change in magnitude is expected to have little influence on mortality trends.[4,5]

Table 1. Change in Age-adjusted Deaths Rates* for Select Causes of Death, Davidson County, TN, 1998

Cause of Death	Adjusted to 2000 Standard Population	Adjusted to 1940 Standard Population	Percent Change in Rate
All Causes	1016.0	578.9	76%
Pneumonia & Influenza	48.0	17.8	170%
Stroke	69.3	30.6	127%
Heart Disease	305.3	156.5	95%
Diabetes Mellitus	30.0	18.6	61%
Cancer	235.3	148.3	59%
Accidents/Unintentional Injury	41.9	33.7	24%
AIDS/HIV	9.2	8.5	8%
Homicide	17.5	18.6	-6%

*Death rates are per 100,000 population.

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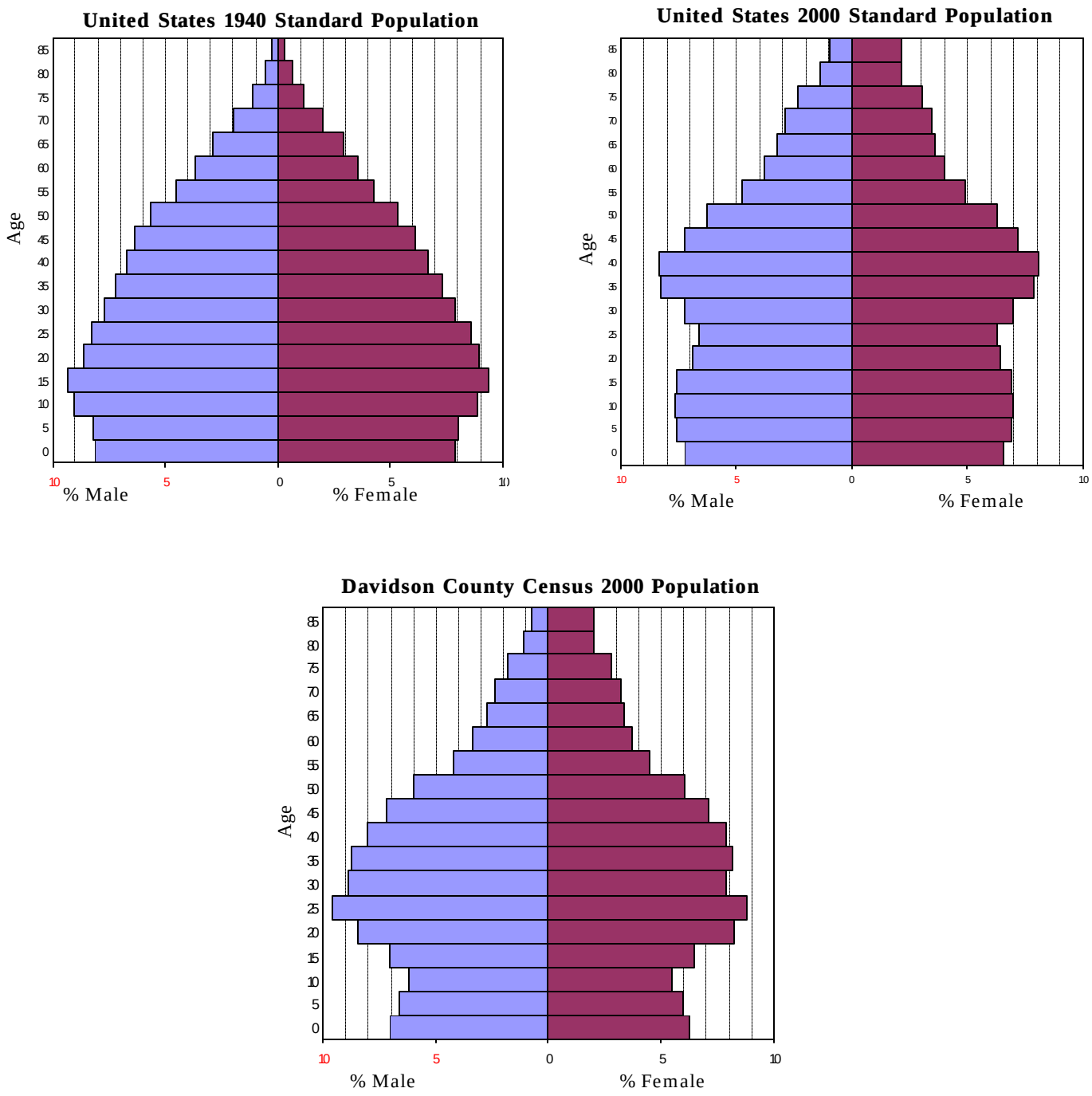
Figure 2. Population Distributions for the U.S. and Davidson County



The most important influence of the new standard population is on the disease-specific mortality rates.[1] Some disease rates are affected by the new standard much more than others. For example, diseases that lead to death at older ages had the biggest rate change when recalculated using the year 2000 standard, with increases of as much as 170% over the 1940-adjusted rates. Age-adjusted death rates for select causes of death in 1998, using both the year 2000 and 1940 standard populations are shown in Table 1. While adjusted rates for deaths from heart disease, pneumonia and influenza, and stroke increased greatly, rates for causes of death more common in younger age groups (homicide, accidents or unintentional injuries, and HIV/AIDS) changed very little or even decreased when the year 2000 standard population was applied.

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❖ Tenth Revision, International Classification of Diseases (ICD-10)

The International Classification of Diseases (ICD) is used throughout the world to classify causes of death. It is maintained by the World Health Organization (WHO). The classification system has been in existence for over 100 years and is currently revised approximately every 10 years to include new syndromes and diseases, and to revise, reclassify, or regroup already catalogued disorders. In the U.S., the ICD-10 replaced the ICD-9 in 1999. For more information on how death coding methods changed in this new revision, please see the Sept/Oct 2000 edition of *Public Health Watch*. (http://healthweb.nashville.org/Web%20Docs/pdf%20copies/septoct2000.pdf)

Mortality statistics are affected greatly by this new revision of the ICD. Mortality statistics that use ICD-10 coding (1999 and forward) cannot be compared to those of previous years which were coded according to ICD-9. When a new revision is released by WHO, the U.S. conducts a comparability study where several years of mortality data are coded by both the new and the old versions of the ICD. The comparability study offers a bridge between the two versions, so that trends in mortality can be followed despite the changes. A *comparability ratio* is calculated for each cause of death based on the dual classification of the data. The ratio is obtained by dividing the number of deaths coded in the new revision (ICD-10) by the number of deaths coded in the previous version (ICD-9).[2] The ratios are then used to adjust mortality statistics for the years where the previous version of the ICD (ICD-9) was used. This makes the statistics comparable to the new year's statistics and enables us to track mortality trends across years.

Table 2 shows the 1990 through 2000 mortality statistics for some of the leading causes of death in Davidson County. We applied the ICD-10 comparability ratios to the 1990 through 1998 rates to produce *modified* mortality rates. The need for the comparability ratios is clearer when you examine the 1999 and *unmodified* 1998 rates in this table. Without the comparability ratios, it would appear that there was a large increase in deaths from Alzheimer's Disease and also a big drop in deaths from influenza and pneumonia. However, from the comparability study, we know that these trends are false. Reorganization and reclassification of these two particular causes of death was quite extensive in the ICD-10, and after applying the comparability ratios for each cause of death, the change from 1998 to 1999 is somewhat attenuated. The National Center for Health Statistics of the Centers for Disease Control and Prevention suggests that changes in mortality rates from 1998 to 1999 be interpreted cautiously. Of the 15 national leading causes of death, eight were considerably changed in the Tenth Revision of the ICD.[3]

- Alzheimer 's Disease deaths were underestimated by as much as 45% in the ICD-9.
- Kidney disease (Nephritis) deaths were underestimated by approximately 23% in the ICD-9.
- Septicemia deaths were underestimated by approximately 19% in the ICD-9.
- Hypertension deaths were underestimated by approximately 12% in the ICD-9.
- Influenza and pneumonia deaths were overestimated by approximately 30% in the ICD-9.
- Stroke deaths were underestimated by approximately 6% in the ICD-9.
- Chronic respiratory disease deaths were underestimated by approximately 5% in the ICD-9.
- Chronic liver disease deaths were underestimated by approximately 4% in the ICD-9.

❖ Census 2000

The year 2000 Census revealed that Davidson County grew faster than expected. In the years between the 1990 and 2000 Censuses, Metro Public Health Department used population estimates that were based on the 1990 Census to calculate mortality statistics. These estimates were provided by the Tennessee Department of Health, Office of Health Statistics and Research. Population estimates are based on birth rates, death rates, domestic and international migration, and other demographic factors. When the 2000 Census was released, we learned that the populations projections for 1999, in particular, underestimated the actual Davidson County population.

Population estimates are especially important for the calculation of mortality statistics because, as defined earlier, they are the denominators used to calculate death rates. When the population is underestimated, the death rates are overestimated, meaning that Davidson County death rates might appear to be worse than they really are. Considering that mortality statistics are used in many public health scenarios to measure the effect of public health interventions, medical advances, environmental improvements, and other aspects of the health and stability of our community, it is important to correct the statistics as soon as possible. Unfortunately, only through hindsight do we learn about these kinds of underestimates. The easiest solution is to recalculate the 1999 statistics using the Census 2000 population and re-evaluate the trends.

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Table 2. Age-adjusted Mortality Rates for Leading Causes of Mortality, Davidson County, Tennessee, and the U.S., 1990-2000

Indicator		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*	2000**
All Causes	Davidson	1017.9	1027.9	1006.4	1049.8	1052.2	1051.2	1047.5	1061.0	1016.0	969.5	970.1
	Tennessee	1016.7	991.5	978.4	1015.5	1024.5	1020.2	1003.9	1010.7	1007.4	1001.9	994.1
	U.S.	938.7	925.5	910.9	931.5	920.2	918.5	902.1	887.0	875.4	877.0	872.4
Heart Disease	Davidson	348.9	349.2	325.7	330.0	321.0	316.6	317.3	317.4	305.3		
	Davidson modified[a]	343.9	344.3	321.1	325.3	316.4	312.1	312.8	312.9	301.0	285.0	275.8
	Tennessee	346.9	337.7	319.9	335.0	332.7	325.9	320.7	322.6	313.9		
	Tennessee modified[a]	342.0	332.9	315.4	330.2	328.0	321.3	316.1	318.0	309.4	305.5	292.8
	U.S.	321.8	313.8	306.1	310.0	299.7	296.3	288.3	280.4	272.4		
	U.S. modified[a]	317.2	309.3	301.8	305.6	295.4	292.1	284.2	276.4	268.5	265.9	257.5
Cancer	Davidson	226.6	231.3	238.8	238.5	238.4	233.4	237.9	240.5	235.3		
	Davidson modified	228.2	232.9	240.4	240.2	240.0	235.0	239.5	242.1	236.9	221.1	219.0
	Tennessee	223.5	220.6	221.2	223.0	225.6	226.5	222.6	223.5	222.0		
	Tennessee modified	225.0	222.1	222.7	224.5	227.1	228.0	224.1	225.0	223.5	218.7	218.3
	U.S.	216.0	215.8	214.3	214.6	213.1	211.7	208.7	205.7	202.4		
	U.S. modified	217.5	217.3	215.8	216.1	214.5	213.1	210.1	207.1	203.8	201.6	200.5
Stroke	Davidson	79.1	69.8	66.5	79.2	80.3	83.8	74.3	81.1	69.3		
	Davidson modified	83.8	73.9	70.4	83.9	85.0	88.8	78.6	85.9	73.4	72.5	79.8
	Tennessee	82.4	75.8	80.5	80.0	83.1	85.6	80.1	78.8	76.2		
	Tennessee modified	87.2	80.3	85.2	84.7	88.0	90.6	84.8	83.4	80.7	78.0	78.4
	U.S.	65.5	63.4	62.1	63.2	63.3	63.9	63.2	61.8	59.6		
	U.S. modified	69.4	67.1	65.8	66.9	67.0	67.7	66.9	65.4	63.1	61.4	60.2
Chronic Lower Respiratory Disease[b]	Davidson	40.9	40.7	37.6	45.9	44.1	44.7	51.0	48.1	46.2		
	Davidson modified	42.9	42.7	39.4	48.1	46.2	46.8	53.5	50.4	48.4	46.7	43.4
	Tennessee	39.9	39.4	39.5	43.9	43.4	43.1	44.5	47.0	49.6		
	Tennessee modified	41.8	41.3	41.4	46.0	45.5	45.2	46.6	49.2	52.0	51.1	52.0
	U.S.	37.2	38.0	37.9	40.9	40.6	40.5	41.0	41.5	42.0		
	U.S. modified	39.0	39.8	39.7	42.9	42.5	42.4	43.0	43.5	44.0	45.5	44.9
Influenza & Pneumonia	Davidson	43.9	42.3	44.7	41.6	50.2	47.2	41.3	46.6	48.0		
	Davidson modified	30.6	29.5	31.2	29.0	35.1	32.9	28.9	32.6	33.5	25.4	23.3
	Tennessee	39.8	38.2	38.0	39.1	42.9	38.9	37.0	40.4	43.5		
	Tennessee modified	27.8	26.7	26.5	27.3	30.0	27.2	25.8	28.2	30.4	30.3	30.9
	U.S.	36.8	34.9	33.1	35.2	33.9	33.8	33.2	33.6	34.6		
	U.S. modified	25.7	24.4	23.1	24.6	23.7	23.6	23.2	23.5	24.2	23.4	24.3
Accidents	Davidson	39.0	33.9	35.5	45.4	41.4	42.0	45.3	39.6	41.9		
	Davidson modified	40.2	35.0	36.6	46.8	42.6	43.2	46.7	40.8	43.2	39.1	45.8
	Tennessee	47.9	44.6	44.4	48.4	46.8	47.8	49.9	47.4	48.6		
	Tennessee modified	49.4	46.0	45.8	49.9	48.2	49.3	51.4	48.8	50.1	49.0	48.2
	U.S.	37.5	36.0	34.6	35.7	35.7	36.0	36.2	36.0	36.3		
	U.S. modified	38.6	37.1	35.7	36.8	36.8	37.1	37.3	37.1	37.4	35.9	33.9
Diabetes Mellitus	Davidson	21.1	22.5	28.6	27.7	29.2	27.7	29.3	33.7	30.0		
	Davidson modified	21.3	22.7	28.8	27.9	29.5	27.9	29.6	33.9	30.2	29.6	31.2
	Tennessee	19.8	19.9	20.9	22.5	21.3	24.3	24.2	25.1	25.2		
	Tennessee modified	20.0	20.1	21.1	22.7	21.5	24.5	24.4	25.3	25.4	26.6	28.4
	U.S.	20.7	20.7	20.8	22.0	22.7	23.4	24.0	23.9	24.2		
	U.S. modified	20.9	20.9	21.0	22.2	22.9	23.6	24.2	24.1	24.4	25.1	24.9

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Table 2 continued. Age-adjusted Mortality Rates for Leading Causes of Mortality, Davidson County, Tennessee, and the U.S., 1990-2000

Indicator		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*	2000**
Homicide	Davidson	13.0	15.8	15.0	16.1	12.9	17.4	16.0	20.5	17.5		
	Davidson modified	12.9	15.8	14.9	16.0	12.9	17.3	16.0	20.5	17.4	12.0	14.3
	Tennessee	11.0	11.5	10.9	10.8	10.3	10.9	9.9	10.1	8.9		
	Tennessee modified	11.0	11.5	10.9	10.8	10.3	10.9	9.9	10.1	8.9	7.6	NA
	U.S.	9.5	10.1	9.6	9.8	9.3	8.5	7.8	7.3	6.7		
	U.S. modified	9.5	10.1	9.6	9.8	9.3	8.5	7.8	7.3	6.7	6.2	5.8
Suicide	Davidson	12.8	17.4	12.6	13.5	13.3	13.6	13.4	15.5	14.3		
	Davidson modified	12.7	17.3	12.5	13.5	13.3	13.6	13.3	15.4	14.2	13.0	12.9
	Tennessee	13.1	13.3	12.8	13.1	12.7	12.9	12.9	13.4	13.5		
	Tennessee modified	13.1	13.2	12.8	13.1	12.7	12.9	12.9	13.3	13.4	13.0	12.7
	U.S.	12.5	12.3	12.1	12.2	12.0	12.0	11.7	11.4	11.3		
	U.S. modified	12.5	12.3	12.1	12.2	12.0	12.0	11.7	11.4	11.3	10.7	10.3
Chronic Liver Disease and Cirrhosis	Davidson	12.2	12.9	12.3	12.6	12.2	11.6	12.1	13.1	10.8		
	Davidson modified	12.6	13.4	12.7	13.1	12.6	12.0	12.6	13.6	11.2	8.5	10.2
	Tennessee	10.9	9.9	9.8	9.6	9.8	9.5	9.8	10.4	9.9		
	Tennessee modified	11.3	10.3	10.2	10.0	10.2	9.8	10.2	10.8	10.3	9.9	10.3
	U.S.	11.1	10.7	10.5	10.3	10.2	10.0	9.7	9.6	9.5		
	U.S. modified	11.5	11.1	10.9	10.7	10.6	10.4	10.1	10.0	9.8	9.6	9.5
HIV-Related Disease	Davidson	10.5	9.9	12.1	16.4	18.4	23.2	18.5	11.5	9.2		
	Davidson modified	12.0	11.3	13.8	18.8	21.0	26.6	21.2	13.1	10.5	8.1	10.4
	Tennessee	4.0	4.5	5.4	7.6	8.6	9.5	7.1	5.0	4.2		
	Tennessee modified	4.6	5.2	6.2	8.7	9.8	10.9	8.1	5.7	4.8	4.6	NA
	U.S.	9.8	11.4	12.7	14.0	15.6	15.8	11.2	5.8	4.6		
	U.S. modified	11.2	13.1	14.5	16.0	17.9	18.1	12.8	6.6	5.3	5.4	5.2
Alzheimer's Disease	Davidson	9.2	8.3	8.5	8.2	12.8	13.4	13.4	10.6	8.6		
	Davidson modified	14.3	12.9	13.3	12.7	19.9	20.9	20.7	16.5	13.4	18.5	17.7
	Tennessee	8.0	8.3	8.0	8.6	9.6	10.0	9.7	9.4	9.1		
	Tennessee modified	12.4	12.9	12.4	13.4	14.9	15.5	15.1	14.6	14.1	18.3	19.2
	U.S.	6.4	6.3	6.3	7.2	7.8	8.4	8.5	8.8	8.6		
	U.S. modified	9.9	9.8	9.8	11.2	12.1	13.1	13.2	13.7	13.4	16.3	17.8

* 1999 rates were calculated using the 2000 census population as the denominator.

** U.S. rates for 2000 are provisional.

[a] Modified rates are given for 1990 through 1998. The original rate was multiplied by the comparability ratio for each cause of death to allow comparison of 1990-1998 rates with 1999-2000 rates. The value of the comparability ratios are: 0.9858 for heart disease, 1.0068 for cancer, 1.0588 for stroke, 1.0478 for chronic lower respiratory infection, 0.6985 for influenza and pneumonia, 1.0305 for accidents, 1.0082 for diabetes mellitus, 0.9983 for homicide, 0.9962 for suicide, 1.0367 for chronic liver disease and cirrhosis, 1.1448 for HIV-related disease, and 1.5536 for Alzheimer's Disease.

[b] Chronic Lower Respiratory Disease was previously called Chronic Obstructive Pulmonary Disease.

Data Sources & References:

Davidson County raw mortality data - Tennessee Department of Health

U.S. age-adjusted mortality rates and comparability ratios -

Deaths: Preliminary Data for 2000. Vol. 49, No. 12. 40 pp. (PHS) 2001-1120.

Deaths: Final Data for 1999. NVSR Volume 49, No. 8. 114 pp. (PHS) 2001-1120.

Compressed Mortality File 1979-1998, Centers for Disease Control and Prevention, http://wonder.cdc.gov

NA = data not available

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❖ Trends from 1990 to 2000

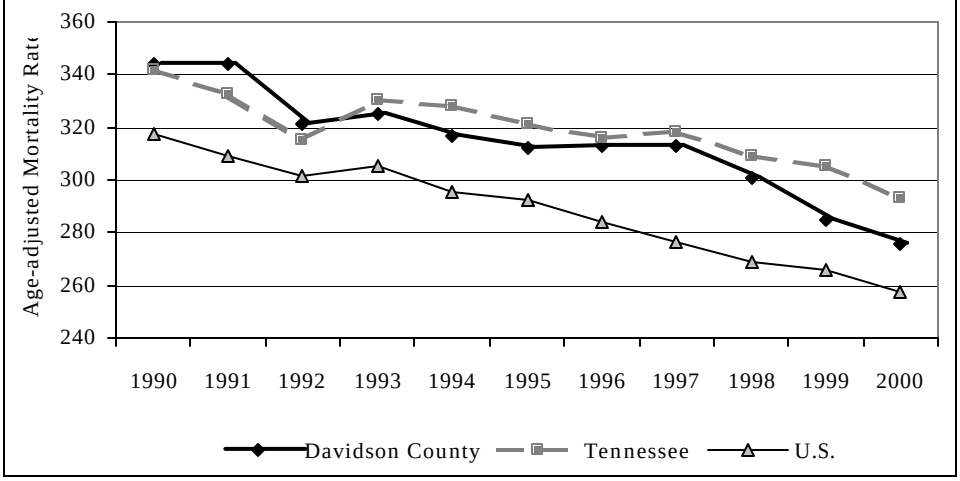
Mortality trends are a key indicator of the public health of a community. The trends can reflect both advances in and failings of medical science and public health. Trends can also reflect certain demographic changes in our community that might be related to health. Mortality trends in Davidson County show that our "all cause" death rate had an increasing trend from 1990 through 1997, but has dropped steadily since 1998 (see Figure 1 and Table 2). In the year 2000, all cause mortality was 5% lower than the 1990 rate and 9% lower than the 1997 rate, which was the 11-year high.

What factors have lead to this decrease in our death rate? This is a difficult question to answer because in the span of 11 years many medical advances have been made both in treatment, which might prevent death, and in diagnosis, which might reveal more deaths from a particular cause. Such topics are beyond the scope of this report. But, on a cursory level, we can learn more about which causes of death are less or more prevalent by studying the disease-specific trends and comparing our rates to those of the state and the nation. All discussion is based on the modified rate.

Heart Disease

Deaths from heart disease have been decreasing slowly over the last 11 years (see Figure 3). Davidson County rates have dropped from 343.9 in 1990 (modified rate) to 274.4 in 2000, a reduction of approximately 20%. Tennessee and U.S. rates of heart disease mortality are also decreasing. Davidson County death rates are typically higher than the U.S. rates – approximately an average of 8% higher from 1990 to 2000 – but were slightly lower than Tennessee rates.

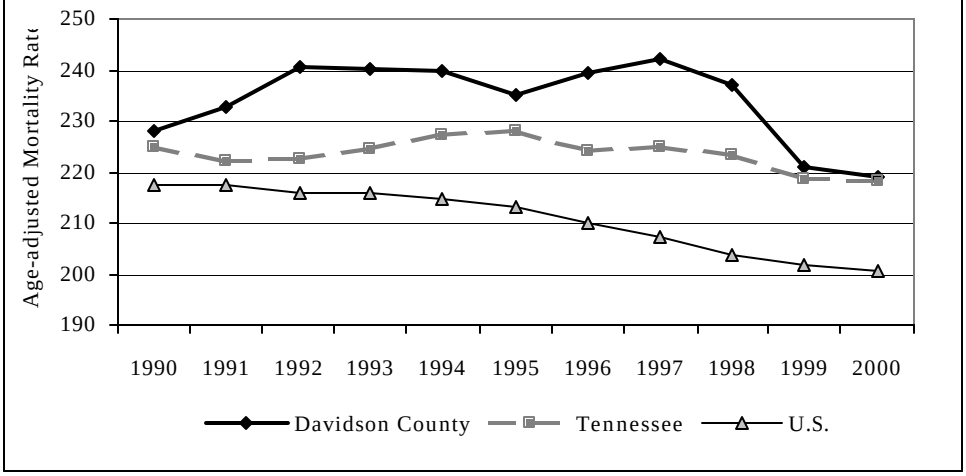
Figure 3. Age-adjusted Heart Disease Mortality Rates per 100,000 Population for Davidson County, Tennessee, and the U.S., 1990-2000



Cancer

There was fluctuation in cancer death rates in Davidson County from 1990 to 2000, but no clear trend (see Figure 4). Nonetheless, the 2000 cancer death rate was 4% lower than the 1990 rate. Davidson County rates were an average 4% higher than Tennessee rates during this period. During the same 11-year period, U.S. rates have gradually decreased. Davidson County rates were an average of 10% higher than the U.S. rates.

Figure 4. Age-adjusted Cancer Mortality Rates per 100,000 Population for Davidson County, Tennessee, and the U.S., 1990-2000



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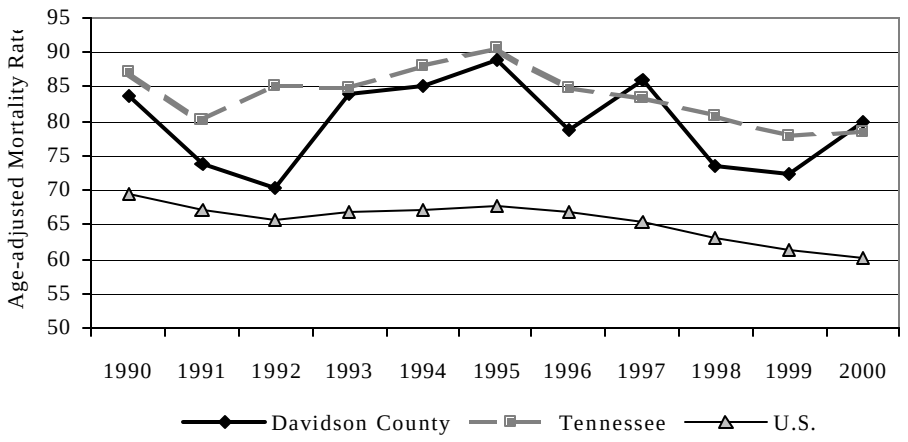
Stroke

Like cancer, there was fluctuation in the stroke death rates in Davidson County in the last 11 years, but there was no clear trend (see Figure 5). The Tennessee death rate for stroke was consistently higher than the Nashville rate for all years except 1997 and 2000. Davidson County rates were an average 17% higher than the U.S. rates during this period and 6% lower than Tennessee rates. Unlike Tennessee and Davidson County, the U.S. had a gradual decline in deaths from stroke for the period 1990 to 2000.

Figure 5. Age-adjusted Stroke Mortality Rates per 100,000 Population for Davidson County, Tennessee, and the U.S., 1990-2000



Chronic Lower Respiratory Disease/Chronic Obstructive Pulmonary Disease

In the last 11 years, chronic lower respiratory disease death rates reached a high of 53.5 in 1996 (modified rate), and then began a declining trend for the following four years, dropping by approximately 19% in that time. In comparison, the U.S. and Tennessee trends have had an increasing trend from 1990 to 2000. Davidson County rates averaged 8% higher than the U.S. during this period. The Tennessee rates were lower than Davidson County's from 1993 to 1997, but in 1998 the Tennessee rate continued to rise and exceeded Davidson's from 1998 through 2000. Following the downward trend of the last four years, the Davidson County year 2000 rate was 4% lower than the U.S. rate and 20% lower than the Tennessee rate.

Influenza and Pneumonia

From 1990 to 1998, there was no clear trend in the Davidson County death rates for influenza and pneumonia. In 1999 we saw the beginning of a decreasing trend as rates dropped by 30% from 1998 to 2000. The U.S. and Tennessee rates have not changed much in the last 11 years. Tennessee rates were generally lower than Davidson County's, except when our mortality rate for influenza and pneumonia dropped in 1999 and 2000. Davidson County rates were an average 20% higher than U.S. rates. With the new decreasing trend in the last 2 years, the Davidson County rate was 4% lower than the U.S. rate in 2000 and 32% lower than the Tennessee rate.

Accidents/Unintentional Injury

The deaths rates for accidents or unintentional injuries show no clear trend from 1990 to 2000 in Davidson County. Tennessee rates are consistently higher than the Davidson County rates – an average of 17% higher over the last 11 years. In comparison, the U.S. rates have remained steady, only showing a slight decline in the last two years. Davidson County rates were an average 11% higher than the U.S. rates over this 11 year period, with a high of 26% above the U.S. rate in the year 2000.

Diabetes

There is an increasing trend in the rate of deaths from diabetes in Davidson County (see Figure 6). The 11-year high was in 1997, with 33.9 deaths per 100,000 population (modified rated). The 2000 rate was 47% higher than the 1990 rate. The U.S. and Tennessee mortality statistics also show an increase in diabetes death rates, but Davidson County rates are growing faster. Davidson County's rate was only 2% higher than the U.S. rate in 1990, but the difference rose to 20% by 2000. Davidson County rates were an average 16% higher than Tennessee rates for this 11-year period.

Homicide

Homicide death rates fluctuated greatly over the last 11 years (see Figure 7). The highest rate was in 1997 when homicide deaths reached 20.5 per 100,000 population. The rate has dropped since then to 14.3 in 2000. During this same period, Tennessee and the U.S. have seen a steady decline in homicide death rates. Davidson County rates are much higher than both Tennessee and the U.S. rates, with an 11-year average rate that was 33% higher than the Tennessee rate and 46% higher than the U.S. rate.

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Figure 6. Age-adjusted Diabetes Mortality Rates per 100,000 Population for Davidson County, Tennessee, and the U.S., 1990-2000

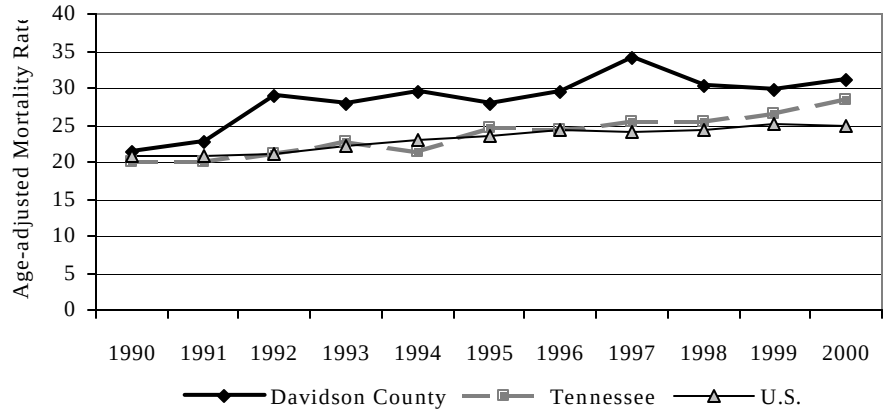
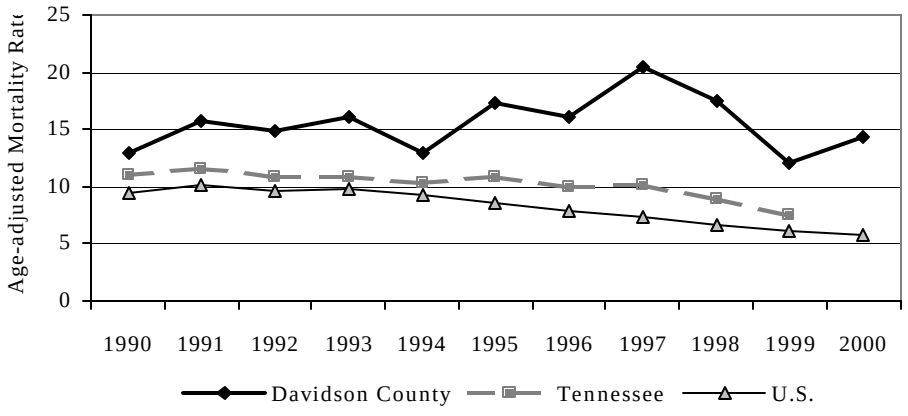


Figure 7. Age-adjusted Homicide Mortality Rates per 100,000 Population for Davidson County, Tennessee, and the U.S., 1990-2000



Suicide

Death rates from suicide changed little over the years from 1990 to 2000. Only twice, in 1991 and 1997, did they rise by more than 10% over the previous year's rate. The U.S. suicide mortality trend has been on a gradual decline, while in Tennessee, there has been virtually no change in the rate in the last 11 years. During this 11 year period, the Davidson County rates have been an average of 15% higher than the U.S. rates and 5% higher than Tennessee's.

Chronic Liver Disease and Cirrhosis

The mortality rate for chronic liver disease and cirrhosis remained steady from 1990 to 1997, then began to decrease in 1998 and 1999 The year 2000 rate rose slightly, but was still 25% lower than the high of 13.6 deaths per 100,000 population in 1997 (modified rate). Like Davidson County, Tennessee rates remained relatively static from 1990 from 2000, but on average were 13% lower than Davidson County's rates. U.S. rates, in comparison, have been on a steady decline since 1990. Davidson County rates were an average 13% higher than U.S. rates for this 11-year period.

HIV-Related Disease

Death rates from HIV-related disease rose steadily from 1990 to 1995, to a high of 26.6 deaths per 100,000 population (modified rate). In 1996 a decreasing trend began, and continued to 2000. Rates dropped 61% from 1995 to 2000. Tennessee, U.S., and Davidson County trends are similar – increasing from 1990 to 1995 and then decreasing from 1996 to 2000 – but, over this 11-year period, Davidson County rates were an average 25% higher than U.S. rates and 55% higher than Tennessee rates.

Alzheimer's Disease

Over the last 11 years, the death rate from Alzheimer's Disease has fluctuated greatly. The high was in 1995, when Davidson County had 20.9 deaths per 100,000 population (modified rate). In both Tennessee and the U.S., the death rate from Alzheimer's Disease has been gradually increasing over the last 11 years. Davidson County rates average 21% higher than the U.S. rates, but by 2000 the rates were nearly identical (Davidson County 17.7 deaths per 100,000 population compared to 17.8 for the U.S.). Davidson County's rates were an average of 8% higher than those of Tennessee for this period.

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Mortality in Davidson County: Methods and Trends, 1990 - 2000...continued from page nine

Comparing 1990 death rates to year 2000 death rates, overall, rates fell for 6 of the 12 leading causes of death examined in this report. Reductions in the top two leading causes of death – heart disease and cancer– partially explain the overall decrease in Davidson County's mortality. These mortality statistics also point to the public health areas that need more attention – namely, prevention and management of chronic disease and the consequences of violence (i.e., homicide). Racial disparity contributes in part to the high rates of deaths from diabetes and homicide in Davidson County. Further analysis of race-specific leading causes of death can be found in Metro Public Health Department's publication *Health Nashville*, which will be released soon.

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Adult Immunization: Preparing for Flu Season...continued from page one

immunocompromised due to age or illness, however, even in this population, the vaccine has been shown to be effective at preventing severe complications that can lead to hospitalization and death.

Ami Sklar, Public Health Epidemiologist I, Division of Epidemiology

The national Advisory Committee for Immunization Practices (ACIP) recommends annual influenza vaccination for individuals at increased risk for complications from influenza. This includes individuals in the following target groups:

- individuals aged 65 and older;
- children aged 6 to 23 months*;
- nursing home residents or residents of other facilities for patients with chronic medical conditions, regardless of age;
- individuals with chronic medical conditions such as diabetes mellitus, hemoglobinopathies (such as sickle cell disease), heart disease, lung disease (including asthma) or kidney disease;
- individuals who are immunocompromised (including immuno-supression caused by medication or HIV infection);
- children and adolescents who are receiving long term aspirin therapy and are therefore at increased risk for Reye syndrome following influenza infection;
- and women who will be in the second or third trimester of pregnancy during the influenza season.[4]

*The influenza vaccine is not FDA approved for children less than 6 months old.

What is Influenza?

Influenza is an acute disease caused by the influenza virus. The virus can cause severe illness, with symptoms of high fever, headache, body aches, sore throat, dry cough, and runny nose. It is highly contagious and is spread from person to person, generally during the colder months of the year (November through May), although outbreaks have been reported during other times of the year. In the worst cases, influenza can cause pneumonia, a severe complication that can lead to hospitalization and even death, especially in persons whose immune systems are weakened due to old age, disease, or medical treatments such as chemotherapy. Influenza virus does not cause symptoms such as nausea and vomiting, commonly attributed to the "stomach flu". These symptoms are often caused by one of several different viruses (Calicivirus and Norwalk-like virus to name a few) and are more appropriately termed "viral gastroenteritis".[2]

Individuals in frequent contact with high-risk individuals should also be vaccinated to prevent transmission. This includes all health care workers and persons living with or caring for someone in one of the target groups listed above such as health care workers and daycare employees. These individuals

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are at first priority for receiving the flu vaccine and should be vaccinated as early as October or November if possible, although vaccinations should still be given in December or later to unvaccinated individuals.

Children aged 6 months to 8 years who are receiving their first flu vaccination should be vaccinated in October or early November if possible because they will need a booster dose one month later.

As a second priority, anyone wishing to reduce the risk of becoming ill with influenza can also be vaccinated. For second priority groups, the optimum time to vaccinate is November, although vaccinations should still be given in December or later to unvaccinated individuals.

Anyone who 1) currently has a high fever, 2) has previously had an allergic reaction to chicken eggs, 3) has previously had a serious reaction to a flu shot, or 4) has Guillian-Barre Syndrome related to a previous influenza vaccination should not receive a flu shot.

2002-2003 Influenza Vaccine

The influenza vaccine typically consists of two A-type strains and one B-type strain. Based on recommendations made by the World Health Organization (WHO) and the Food and Drug Administration (FDA), the 2002-2003 trivalent influenza vaccine will consist of the following strain types:

H1N1, A/New Caledonia/20/99
H3N2, A/Panama/2007/99 (an A/Moscow/10/99-like virus)
B/Hong Kong/330/2001-like virus strain[4]

Influenza vaccine is most effective when it precedes exposure by no more than 2 - 4 months. Vaccinating earlier than September may cause immunity to wane by the time flu activity peaks (late December to early March depending on the year).[5]

Pneumococcal Disease

Another vaccine, often administered along with the influenza vaccine because it is recommended for many of the same target groups, is the pneumococcal polysaccharide vaccine (PPV). This vaccine has been shown to be effective in preventing severe complications and invasive disease caused by *Streptococcus pneumoniae*.[6] Currently, *S. pneumoniae* is the leading cause of bacterial pneumonia and meningitis in the U.S. In the past, *S. pneumoniae* was almost always susceptible to penicillin, however, resistance to penicillin is increasing. Resistance levels vary by region, and Tennessee rates are some of the highest in the nation (38% according to one study) making this issue of particular concern locally. In addition, some isolates have developed resistance to multiple drugs making the disease extremely difficult to treat.[7] Pneumococcal infections result in up to 500,000 cases of pneumonia, 60,000 cases of bacteremia, 2,800 cases of meningitis and between 10,000 and 40,000 deaths annually.[8,9] It is estimated that more than 50% of these deaths can be prevented with the use of PPV.[8]

The ACIP recommends a one-time PPV vaccine for: everyone aged 65 and older; and for persons aged 2* to 64 with certain chronic medical conditions such as diabetes mellitus, heart disease, lung disease (not including asthma), functional or anatomic asplenia (absent or diseased spleen), kidney failure, alcoholism, and cirrhosis. Immunocompromised individuals should also receive PPV (HIV infected individuals should get vaccinated as soon as possible).[6] Children under 2 years of age do not mount an immune response to PPV and should not be vaccinated with it. Another vaccine, the pneumococcal conjugate vaccine (PCV) is effective in children less than 2 years old.[6]

Anyone over 65 who received their first dose of PPV before age 65, should be re-vaccinated if more than 5 years have passed since the first dose was given. Re-vaccination with PPV is also recommended 5 years after the first vaccination (3 years for children aged 2-10) for asplenic persons, persons on dialysis or with renal failure, and immunocompromised persons.[6]

What is Pneumococcal Disease?

Pneumococcal disease is actually a group of infections that includes otitis media (ear infection), sinusitis, pneumonia, septicemia, and meningitis, all caused by the gram-positive bacterium *Streptococcus pneumoniae*. Transmission occurs person-to-person via respiratory droplets from the nose or mouth of a person with a pneumococcal infection. Symptoms of pneumococcal pneumonia include headache, chills, fever, chest congestion, cough, greenish-yellowish sputum, and sharp chest pain caused by breathing. Approximately 20%-30% of patients with pneumococcal pneumonia will develop bacteremia and other complications.[8]

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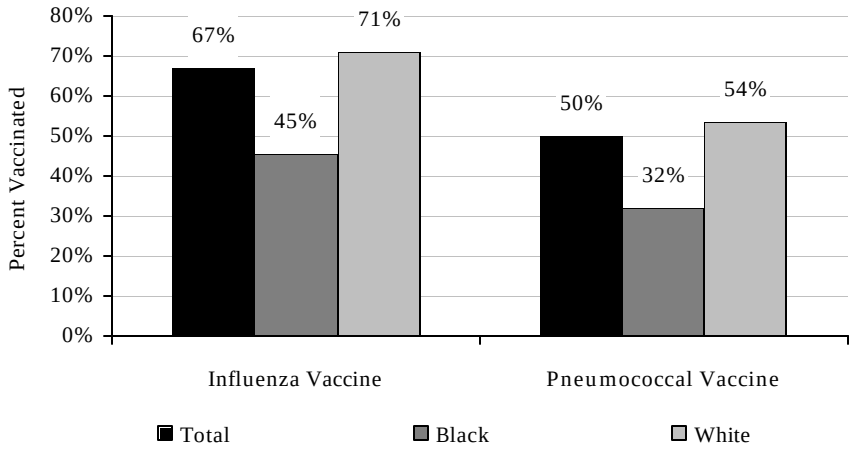
Persons living in certain environments or settings leading to an increased risk for pneumococcal disease should also be vaccinated. Nursing homes and other long-term care facilities housing large populations of elderly or individuals with chronic illness should be targeted for vaccination to prevent disease outbreaks among residents. Historically, this population has very low vaccination rates. In 1999, results from the National Nursing Home Survey found that only 38% of nursing home residents had been vaccinated with PPV.[10] Several recent outbreaks of pneumococcal disease in nursing homes were specifically attributed to under-vaccination of the nursing home residents.[11,12]

Estimating Vaccination Levels in Nashville

The U.S. Department of Health and Human Services (DHHS) has identified influenza and pneumococcal vaccination rates as important national health status indicators. The Healthy People objective for influenza and pneumococcal vaccination is that 90% of adults, aged 65 and older, would be receiving annual influenza vaccinations and would have received a one-time dose of pneumococcal vaccine by year 2010.[13]

The Metro Public Health Department conducts a survey every other year to assess the health behaviors of Nashville residents known as the behavioral risk factor surveillance survey (BRFSS). In 1998, BRFSS respondents were asked two questions related to immunization: "During the past 12 months, have you had a flu shot" and "Have you ever had a pneumonia vaccination?" Among respondents aged 65 and older, the percentage reporting influenza vaccination was 67%. A racial disparity is evident, with a smaller proportion of blacks reporting influenza vaccination than whites (see Figure 1). Only 50% of respondents aged 65 and older reported receiving a pneumonia vaccination (PPV) and again a racial disparity was apparent. Fifty-four percent (54%) of white respondents but only 32% of blacks reported receiving PPV by 1998.[3]

Figure 1. Percentage of 1998 BRFSS Respondents Aged 65 and Older Who Reported Receiving Influenza and Pneumococcal Vaccination by Race, Nashville, TN



A second source of adult immunization data for Nashville is the Center for Medicare and Medicaid Services (CMS), which collects information on influenza and pneumococcal vaccination of Medicare beneficiaries from billing records.* This data shows that, similar to the BRFSS results, blacks have a lower vaccination rate than whites. In 2000, white Medicare beneficiaries aged 65 and older had influenza and PPV vaccination rates that were nearly double the rates among blacks[3] (see Figure 2). (*This data was provided to Metro Public Health Department by the CMS quality improvement organization for Tennessee, the Center for Health Care Quality.)

The large disparity in pneumococcal vaccination rates between blacks and whites in Nashville is especially concerning because blacks are twice as likely to develop bacteremia from pneumococcal infection than are whites.[9]

How can we increase adult vaccination rates in Nashville?

Although flu season is still 6 months away, now is the time for providers to start thinking about how to best vaccinate those patient populations most at risk for complications from influenza, as well as pneumococcal disease, and to focus on those population groups with disproportionately lower vaccination rates, notably African Americans. The Task Force on Community Preventative Services released a report in 1999 highlighting several "evidence-based" strategies with proven effectiveness for improving adult vaccination coverage.[15]

Standing orders were touted as the "most consistently effective means for increasing vaccination rates". A standing order is a written policy, which states that anyone meeting certain age and risk factor criteria should receive a medical service, such as a vaccination. One of the major strengths of this strategy is that it can be effective in a variety of health-care settings including hospitals, emergency rooms, primary care clinics, and nursing homes. A similar strategy that can be used is a pre-printed order, the

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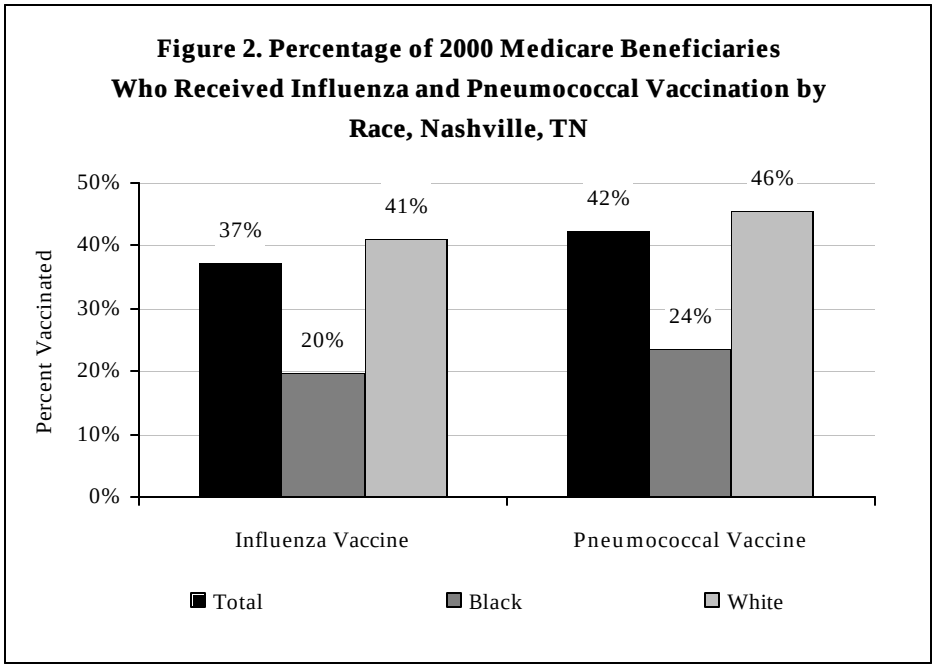

*Note: Influenza vaccination rates were lower in 2000, likely a result of the delay in influenza vaccine availability in 2000. [14]

only difference being pre-printed orders are written for each patient, whereas standing orders are written only once for an entire patient population and do not require a physician's signature for each individual patient.[16,17]

Other methods proven effective at increasing adult vaccination levels in a clinic setting include computerized record reminders, chart reminders, performance feedback, home visits, mailed or telephoned patient reminders, personal health/immunization records, and patient education.[16,17]

Resources

A sample adult immunization record form developed by the Immunization Action Coalition is available to physicians and other health care professionals at http: www.immunize.org/catg.d/p2023b.pdf.[18] For a more in-depth overview of evidence-based strategies for improving adult immunization levels, along with tools and tips for implementation, visit <www.cdc.gov/nip/publications/adultstrat.htm>.[17]

Providers seeking information on how to bill Medicare for administering influenza and pneumococcal vaccinations can visit: <www.cms.hhs.gov/preventiveservices/2f.pdf> for step-by-step instructions.[19]

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National Immunization Goal Set At 90% Completion Rate For 24-Month Old Children

Physicians, Where Does Your Practice Rate?

Let CASA Give You The Answers

Denise Stratz, PHN III, Division of Communicable Disease Control/ Immunization Promotion

Denise Stratz, PHN III, Division of Communicable Disease Control/ Immunization Promotion

What is CASA?

The Clinic Assessment Software Application, CASA, is a menu driven database developed by the National Immunization Program, Centers for Disease Control and Prevention (CDC), as an assessment tool for immunization clinics and providers. CASA is used for the data entry and analysis of a practice-based vaccination assessment. A CASA assessment can help providers understand their current vaccination coverage levels and diagnose their immunization delivery system problems

CASA Helps Pinpoint Specific Problems

CASA provides detailed reports on the specific diagnosis of the problem, for example, whether record-keeping and documentation are adequate, whether children start their series on time, whether and when patients drop out of the system, whether recall is used effectively, or whether vaccines are given simultaneously. It can also be used to identify whether vaccines are being given within the recommended age ranges and target specific doses of vaccine that are a problem for the practice.

Why Use CASA?

CASA assesses the vaccination rates in your office and evaluates the needs of your patients. Improvement opportunities are identified to increase your office's vaccination rates. This assessment also allows your practice to meet Standard 14 of the Pediatric Immunization Practices, which states "providers will conduct semiannual audits to assess vaccination coverage levels and to review vaccination records in the patient populations they serve."

How CASA Works

A date is set for the assessment in your clinic site. Based on this date, a birth date range is determined which will target all the 24-26 month old children in your practice. This birth date range is given to the practice and the charts for children who fall within this birth date range are selected for review. An Immunization Program representative from the Health Department will enter the immunization information into the CASA database from each chart. This information will be analyzed by CASA program and a report will be generated. This report will be reviewed with the practice within two weeks of the initial data entry.

Proven Results

You may be surprised by the results. Most doctors expect their total childhood vaccination rate to be very high. However, once these practices are assessed using the CASA program, they realize that their vaccination rates could be improved. The Maternal Child Health Clinic at Nashville General Hospital has had CASA's performed on their practice since 1997. During this 5-year period a total of three CASA's have been performed. The completion rate for the 24-month old children with the basic series has gone from 54% to 80%. Terrace Pediatric Group went from a completion rate of 57% in 1999 to 80% in 2002. So, as you can see, CASA works.

How to Schedule a CASA at Your Practice

To schedule an appointment to have a CASA performed at your office site please call Denise Stratz, RN at 340-2174.

Co-Occurring Mental and Substance Use Disorders Among Tennessee Adolescents

Craig Anne Heflinger, Ph.D., Principal Investigator, & Andrea Flowers, Data Disseminator

Co-occurring mental and substance use disorders are typically not recognized or treated as a distinct problem among adolescents in TennCare or in publicly-funded treatment programs. One quarter (27%) of youth entering Tennessee's publicly-funded treatment programs for substance use problems met the criteria for a co-occurring substance abuse and serious emotional disorder (SED), according to findings from the IMPACT Study *. The study also found that 12% of TennCare adolescents, which is equivalent to 12,000 individuals, were found to have potentially co-occurring substance use and mental disorders and were in need of at least a screening.

In order to determine the number of persons affected by both substance abuse/dependency and a serious emotional disorder, researchers calculated numbers for co-occurrence by identifying adolescents with one issue and then determined how many of them were affected by the other as well. Two groups of adolescents were included in this aspect of the IMPACT Study. First, in a randomly selected representative sample of adolescents who were on TennCare, the youth were first classified as having/not having SED based on information from parent interviews. In order for an individual to have been classified as having SED, he/she had to meet the two-part definition required by the federal mental health block grant funding and the Tennessee Department of Mental Health. 30% of all TennCare adolescents met the criteria for being classified as SED. Of this group, 39% reported alcohol or drug use within the six months prior to the interview, and were considered substance users. It was determined that this group of youth could benefit from a screening for a co-occurring substance abuse and mental health disorder.

In a second part of the IMPACT Study, adolescents entering publicly-funded substance abuse treatment programs in Tennessee were referred by Tennessee behavioral health providers who served youth with substance abuse problems. Based upon the youth's reported level of alcohol or drug use and their consequences of substance use, the adolescents included in the study were classified as having substance abuse, substance dependence, or no/possible abuse. 92% of the adolescents involved in the study met criteria for either substance abuse or substance dependence. Of this group, 27% were classified as SED, according to the same criteria as was used in determining whether the TennCare adolescents had SED. From the data collected from the interviews of youth in the publicly-funded treatment system, some of the other preliminary findings are as follows:

- 100% of youth reported use of alcohol or other drugs at some point in their life.
- The most frequently reported concerns of use were interpersonal problems related to use, dangerous behavior, interference with role obligations (such as family, school, work), and excessive use.
- Over one-fourth (29%) of these youth had previously taken medication for emotional or behavioral problems.

These findings were further supported by information from interviews with providers who served adolescents with co-occurring substance abuse and mental health problems. Providers reported that approximately 80% of youth who were court-ordered to treatment in regional mental health institutes also had substance abuse problems. All but one of the providers interviewed indicated that the majority of the youth who were receiving substance abuse treatment also had mental health issues that needed to be addressed.

The IMPACT Study found that training, funding, and coordination are the major issues that need to be addressed by the current service system. Very few providers are cross-trained to treat both mental health and substance abuse problems. One Tennessee adolescent treatment unit, Western Mental Health Institute, served as a model agency at the time of the study that modified its treatment program to identify and treat substance abuse disorders among adolescents with mental health problems. Even when providers are cross-trained, however, Tennessee's current system does not often provide funding for providers to treat co-occurring disorders. Through TennCare, the funding is typically available to treat substance abuse problems or mental health problems, not both. In addition, there is no system in place to coordinate services at the state or provider levels.

For more information, please contact:
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Tennessee Voices for Children at
800/670-9882 or e-mail at:
aflowers@tnvoices.org.

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Co-occurring Mental and Substance Use Disorders among Tennessee Adolescents...continued from page fifteen

*This article is based on one of several reports from the IMPACT Study, conducted by Vanderbilt University's Center for Mental Health Policy in conjunction with Tennessee Voices for Children, the Tennessee Commission on Children and Youth, and Mississippi Families as Allies. The IMPACT Study focused on mental health and substance abuse issues of school-aged Medicaid children and adolescents in Tennessee and Mississippi, and was funded by the United States Department of Health & Human Services (USDHHS) Substance Abuse and Mental Health Services Administration (SAMHSA) as part of a national study to examine the impact of Medicaid managed care on vulnerable populations. To view/ download a copy of any report in it's entirety, please go to: www.vanderbilt.ed/VIPPS/CMHP/ publications.html#Impact.

Joseph Schuchter Joins the Staff of the Division of Epidemiology

Joseph Schuchter, Public Health Epidemiologist I, Division of Epidemiology

Joseph Schuchter, MPH, joined the Division of Epidemiology on June 17th, 2001. His experience covers a broad range of topics including program planning; grant-writing; community-based behavioral, epidemiological and operations research; and infectious disease epidemiology. His work has been both international and domestic in nature, involving government and non-government organizations. Joe earned his Masters of Public Health in Epidemiology and International Health at the University of Alabama-Birmingham (UAB) School of Public Health. During his graduate studies, he interned at the Gorgas Tuberculosis Initiative at UAB, where he continued to work upon graduation. Joe's responsibilities in the Division of Epidemiology will encompass communicable disease epidemiology, focused especially on bioterrorism. He may be reached at (615) 340-2733 or e-mail at: joseph.schuchter@nashville.gov.

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To Raise the Collective Public Health Knowledge of MPHD Employees

To better prepare a competent and confident workforce in the practice of public health, Metropolitan Public Health Department of Nashville and Davidson County (MPHD) launches the Lentz University Public Health Certificate Program. The pilot class began on August 7, 2002, enrolling more than 20 students, including division directors, supervisors, members of MPHD's Executive Management Team, health officials from surrounding areas, and graduate students from Meharry Medical College. This program is designed for MPHD employees and will provide an overview of the concepts and theories behind the core functions of public health.

The class will meet every Wednesday and Thursday for 2 hours for four months. The course will focus on monitoring, diagnosing, and reacting appropriately to emerging public health issues, and on research and evaluation of public health programs.

The program will prepare all MPHD employees to meet or exceed nationally recognized public health workforce competencies. The program also has a community component. A Lentz University Community Scholars Program is in the planning stage. This Program will educate community leaders regarding health promotion and diseases, injuries, and disability prevention thus enabling the community to better care for itself in these areas.

Dr. Stephanie Bailey, Director of Health, leads the discussion during the first class of the Lentz University Public Health Certificate Program.

The students who comprise the first class of the Lentz University Public Health Certificate Program are filmed and photographed as they prepare for the second day of class.

Reported cases of selected notifiable diseases for May/June 2002

Disease	Cases Reported in May/June		Cumulative Cases Reported through June	
	2001	2002	2001	2002
AIDS	33	45	273	105
Campylobacteriosis	10	4	18	14
Chlamydia	353	301	1,101	1,012
DRSP (Invasive drug-resistant *Streptococcus pneumoniae*	3	3	15	18
Escherichia coli 0157:H7	3	0	3	1
Giardiasis	6	0	8	10
Gonorrhea	299	204	856	622
Hepatitis A	6	2	15	12
Hepatitis B (acute)	7	1	12	9
Hepatitis B (perinatal)	1	0	11	9
HIV	43	53	170	158
Influenza-like Illness	0	0	131	223
Neisseria meningitidis disease	2	1	7	2
Salmonellosis	9	12	22	32
Shigellosis	2	3	3	6
Syphilis (primary and secondary)	14	0	41	20
Tuberculosis	8	12	27	31
VRE (Vancomycin-resistant enterococci)	6	4	37	32

To report a notifiable disease, please contact:

Sexually transmitted diseases: John Coursey at 340-0455
Tuberculosis: Diane Schmitt at 340-5650
AIDS/HIV: Mary Angel-Beckner at 340-5330
Hepatitis C: Jennifer Blackmon at 340-5671
Hepatitis B: Denise Stratz at 340-2174
Vaccine-preventable diseases: Mary Fowler at 340-2168
All other notifiable diseases: Pam Trotter at 340-5632

Return Service Requested

Public Health Watch welcomes feedback, articles, letters, and suggestions. To communicate with *Public Health Watch* staff, please:

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